Lab 11

EE 324: Signals and Systems II

We will study several simple examples of feedback control systems.

1 Prelab assignment

1. PID is one of the most popular controllers used in industrial. Go through this page https://en.wikipedia.org/wiki/PID_controller to get a basic idea of PID

2. Calculate the closed loop transfer function with plant G(s) and controller $C(s) = K_P + \frac{K_I}{s} + K_D s$ when $K_I = K_D = 0$ and

- a) $G(s) = \frac{1}{s-1}$
- b) $G(s) = \frac{1}{s^2 s}$

c)
$$G(s) = \frac{(s^2+s+1)}{s(s+4.4)(s-4.4)}$$

3. Determine the range of K_P, K_D (assuming $K_I = 0$) for a), b), c) such that the corresponding closed loop system is stable.

2 Lab assignment

1. One goal of controller design is to make the output follow the input as close as possible. A good test input signal is the step input u(t). Simulate the output of the closed loop system corresponding to a) with some proper K_P, K_D .

2. Simulate the system with different K_P, K_D values. Describe your observations.

3. Choose K_I to be some small numbers and simulate the system again. Describe your observations.

4. Repeat 1-3 for b) and c)